Commissioner for Patents
October 17, 2006
Page 13 of 22

Serial No. 10/764,247 Confirm. No.: 8047
Art Unit: 2133 Examiner: Baker, Stephen M.
IBM Docket: FR920020090US1 (4206)

REMARKS

Applicant sincerely appreciates the allowance of claims 1-6, provided they have been rewritten or amended to overcome the rejections under 35 USC § 112, second paragraph, as set forth in this Office Action. Applicant also sincerely appreciates the allowance of claims 10-12, provided the claims are rewritten in independent form including all of the limitations of the base claims and intervening claims. Applicant believes that the base claims, as currently amended, will be allowable. However, Applicant respectfully offers to rewrite claims 10-12 in such independent form if the currently amended base claims are objected to by Examiner.

The Office action objects to the drawing of Figure 4 as being confusing. The disclosure is objected to because of several informalities. Claims 1 and 12 stand rejected because of informalities.

Claims 1-7 stand rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Claim 7 stands rejected under 35 USC § 102(b) as being anticipated by Apple U.S. Pat. 3,771,126 (hereinafter "Apple") and by Brueckheimer et al U.S. Pat. 5,923, 680 (hereinafter "Brueckheimer"). The Office action further rejected claim 8 under 35 USC § 103(a) as being unpatentable over Apple, and rejected claims 8 and 9 under 35 USC § 103(a) as being unpatentable over Brueckheimer. Applicant respectfully suggests that the rejections with respect to the claims are traversed in light of the amendments and the following remarks.

Drawing Objections

Applicant respectfully requests that replacement sheet 3/7 with figures 3 and 4 replace the originally filed figures 3 and 4. The replacement figure 4 modifies the depiction of the Double-bit Error at End of Packet syndrome set, the Triple bit Error 58-19-0 Space syndrome set, and the double-bit Error at End of Packet syndrome set as they overlap the Double-bit and Single-bit Error at Beginning of Packet syndrome sets. The amendments to figure 4 show the overlaps between syndrome subsets consistent with the standard manner of Venn diagrams and is accordingly less confusing. The amendments do not add new matter.

Commissioner for Patents
October 17, 2006
Page 14 of 22

Serial No. 10/764,247 Confirm. No.: 8047
Art Unit: 2133 Examiner: Baker, Stephen M.
IBM Docket: FR920020090US1 (4206)

Specification Objections

The proposed amendments to the disclosure address each of the objections in the Office action due to informalities. Thus, Applicant respectfully requests that the amendments be entered and the objections be withdrawn.

Claim objections due to informalities

The proposed amendments to claims 1 and 12 address each of the objections for both claim 1 and claim 12 in the Office action. Thus, Applicant respectfully requests that the amendments be entered and the objections be withdrawn.

Claim rejections under 35 USC § 112, second paragraph

Claims 1-7 stand rejected under 35 USC § 112, second paragraph, as failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Applicant respectfully suggests that the rejections are traversed based upon the amended claims and the following remarks.

The Office action states that the "method of shortening a" in claim 1 should apparently should be "method of generating a decoder for a shortened" or the like.

As amended, claim 1 states:

1.   A method of detecting and correcting random bit errors in a digital transmission system using a shortened single-bit error correction/double-bit error detection code wherein data is scrambled after said error detection/correction code is applied over a set of data comprising:

obtaining unique syndromes for all combinations of multiplied errors completely confined to a set of data;

obtaining unique syndromes for those combinations of said multiplied errors occurring at the end of said set of data and overlapping a next set of data;

remembering the end unique syndrome types for allowing correction of said next set of data; and

obtaining syndromes for all combinations of said multiplied errors occurring at the beginning of said set of data that are at least unique per said end types.

Commissioner for Patents
October 17, 2006
Page 15 of 22

Serial No. 10/764,247 Confirm. No.: 8047
Art Unit: 2133 Examiner: Baker, Stephen M.
IBM Docket: FR920020090US1 (4206)

Claim 1 recites "A method of detecting and correcting random bit errors ... using a shortened single-bit error correction/double-bit error detection code ..." As previously written, Claim 1 appeared to describe the steps required for constructing a decoder. As currently amended, Claim 1 generally describes a procedure that may be employed to correct errors of a digital transmission using a shortened detection code, such as a shortened group of odd-weight Hamming codes. This "shortened single-bit error correction/double-bit error detection code" of Claim 1 is described thoroughly in the specification. For example, the selection of a specific code generating polynomial to detect single error correction/double error detection, is discussed on page 17, lines 1 through 10. Additionally, a reason such code is "shortened" for use in a scrambler according to the invention is discussed on page 19, lines 13 through 21. In light of the amendments to Claim 1, as well as the cited items of reference, Applicant respectfully requests the rejection for Claim 1 be withdrawn.

The Office action also states that the scope of "Hamming-like," beyond having the already-specified SEC/DED capacity, is not apparent. Claim 4 was amended, removing the "Hamming-like" language. Applicant has revised Claim 4 to now read "... wherein said error detection/correction code is an odd-weight extended Hamming code." In this current form, "odd-weight Hamming codes" refers to a specific type of Hamming code discussed in the specification, in lines 5 through 10 on page 17. The specification also included a reference which provided more details for odd-weight extended Hamming codes. As amended, Claim 4 removes the ambiguity of the formally drafted "Hamming-like", so Applicant respectfully requests the rejection for Claim 4 be withdrawn.

The Office action further states that in Claim 7 the phrase "wherein said ... code is determined according to syndrome" is elliptical and vague enough to read on typical syndrome decoding, i.e. "the code(word) sent is determined according to the syndrome" and apparently should be 'wherein said ... code is a code selected according to the syndromes generated thereby" or the like. Applicant revised Claim 7 so that it currently reads "... wherein said predetermined shortened forward error correction code is selected according to syndromes generated thereby". In this amended form, Claim 7 no longer implies that the error correcting

Commissioner for Patents
October 17, 2006
Page 16 of 22

Serial No. 10/764,247 Confirm. No.: 8047
Art Unit: 2133 Examiner: Baker, Stephen M.
IBM Docket: FR920020090US1 (4206)

"code is determined according to syndrome". As previously written, Claim 7 appeared to require generating a forward error correcting code based upon a syndrome. However, since syndromes are the product of received data and forward error correcting code, the formally worded version could have implied using elliptical or circular logic and make such version of Claim 7 vague. As currently amended, Claim 7 eliminates such circular logic and is no longer vague. Additionally, Claim 7 no longer reads on typical syndrome decoding, since it now employs forward error correction bits selected according to the syndromes generated thereby, such as the syndromes generated with respect to a subgroup of odd-weight vectors based upon the scrambler polynomial. Consequently, Applicant respectfully requests the rejection for Claim 7 be withdrawn.

Commissioner for Patents
October 17, 2006
Page 17 of 22

Serial No. 10/764,247 Confirm. No.: 8047
Art Unit: 2133 Examiner: Baker, Stephen M.
IBM Docket: FR920020090US1 (4206)

Claim rejections under 35 USC § 102

Claim 7 stands rejected under 35 USC § 102(b) as being anticipated by Apple (US 3,771,126) and by Brueckheimer et al (US 5,923, 680). Applicant respectfully suggests that the rejections with respect to amended independent Claim 7 are traversed with the following remarks.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference.[1] Furthermore, the identical invention must be shown in as complete detail as is contained in the claim.[2]

More specifically, the Office action states:

Apple discloses an FED encoder and decoder for correcting scrambler-multiplied errors. Apple's FEC encoding (113, 114) is "computing forward error correction bits of said selected set of data ..." and "merging said selected set of data and said forward error correction bits ..." and is performed before scrambling (116). Apple's code is selected for its ability to generate suitable syndromes (Theorem 2, column 5).

The Office action continues by stating that Brueckheimer anticipates Claim 7 for essentially the same reason. More specifically, the Office action states:

Brueckheimer discloses an FED encoder and decoder for correcting scrambler-multiplied errors. Brueckheimer's FEC encoding (not shown) is "computing forward error correction bits of said selected set of data ..." and "merging said selected set of data and said forward error correction bits ..." and is performed before scrambling. Brueckheimer's code is selected for its ability to generate suitable syndromes.

Amended independent Claim 7 states:
7. A method for transmitting data and associated redundant information allowing error detection and correction upon reception, said method comprising:
    selecting a set of data:

    computing forward error correction bits of said selected set of data according to a predetermined shortened forward error correction code;

    merging said selected set of data and said forward error correction bits to form a packet;

    scrambling said packet; and
    transmitting said scrambled packet,

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[1] *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987).
[2] *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989).

Commissioner for Patents
October 17, 2006
Page 18 of 22

Serial No. 10/764,247 Confirm. No.: 8047
Art Unit: 2133 Examiner: Baker, Stephen M.
IBM Docket: FR920020090US1 (4206)

wherein said predetermined shortened forward error correction code is selected according to syndromes generated thereby.

Neither Apple nor Brueckheimer describe, expressly or inherently, the elements of currently amended independent Claim 7 such as "...computing forward error correction bits of said selected set of data according to a predetermined shortened forward error correction code ...". More specifically, Apple does not employ shortened error correction codes to calculate syndromes. Instead, Apple divides information sequences by two separate feedback polynomials to obtain remainders with connection matrices to locate and correct bit errors. In other words, Apple does not describe using a shortened error correction code when transmitting selected sets of data, but instead describes calculating remainders and associated syndrome components to locate and correct bit errors. Brueckheimer also does not employ shortened error correction codes to calculate syndromes. Brueckheimer performs single bit error corrections when syndrome error and parity error words are both non-zero and performs double bit error corrections when the syndrome error is non-zero and parity error word is zero. Similar to Apple, Brueckheimer does not describe using a shortened error correction code when transmitting selected sets of data, but instead describes correcting errors based upon the different combinations of syndrome and parity errors. Thus, Applicant respectfully requests that the rejection of amended Claim 7 be withdrawn and that amended claim 7 be allowed.

Commissioner for Patents
October 17, 2006
Page 19 of 22

Serial No. 10/764,247 Confirm. No.: 8047
Art Unit: 2133 Examiner: Baker, Stephen M.
IBM Docket: FR920020090US1 (4206)

Claim rejections under 35 USC § 103(a)

The Office action rejected claim 8 under 35 USC § 103(a) as being unpatentable over Apple, and rejected claims 8 and 9 under 35 USC § 103(a) as being unpatentable over Brueckheimer. Applicant respectfully suggests that the rejections with respect to the claims are traversed in light of the amendments to claim 8 and the following remarks. To establish a prima facie case of obviousness, three basic criteria must be met.[3] First, there must be a suggestion or motivation to modify or combine the references.[4] Second, there must be a reasonable expectation of success in the modification or combination.[5] Finally, the modification or combination must teach or suggest all of Applicants' claim limitations.[6]

Amended independent Claim 8 states:

8.   A method for recovering information encoded in a received data packet, said received data packet being scrambled and containing shortened forward error correction bits, said method comprising:

descrambling said received data packet;

computing a syndrome of said descrambled received data packet, wherein the syndrome is computed via the shortened forward error correction bits of the received data packet; and

if said syndrome is an all-zero syndrome, extracting the data from said received data packet.

Similar to Claim 7, neither Apple nor Brueckheimer describe, expressly or inherently, the elements of currently amended independent Claim 8 such as "…computing a syndrome of said descrambled received data packet, wherein the syndrome is computed via the shortened forward error correction bits of the received data packet …". In fact, both Apple and Brueckheimer tend to teach away from the method described in Claim 8. Both Apple and Brueckheimer discuss correcting errors in the received data based upon calculated syndromes but do not discuss shortening the forward error correction codes to be sent with the data transmitted.

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[3] Manual of Patent Examining Procedure §2142.
[4] *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).
[5] *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097, 231 USPQ 375, 379 (Fed. Cir. 1986).

Commissioner for Patents
October 17, 2006
Page 20 of 22

Serial No. 10/764,247 Confirm. No.: 8047
Art Unit: 2133 Examiner: Baker, Stephen M.
IBM Docket: FR920020090US1 (4206)

In accordance with the claim amendments, claim 9 is dependent upon amended independent claim 8. Applicant respectfully suggests that amended independent claim 8 and dependent claim 9 are not anticipated by either Apple or Brueckheimer as discussed above. Because the rejections of claims 8 and 9 are predicated upon anticipation of previously unamended versions of those claims by Apple and/or Brueckheimer, Applicant believes that these rejections of Claims 8 and 9 are no longer applicable. More specifically, as amended, Applicant does not believe that either Apple or Brueckheimer teach or suggest all of Applicants' claim limitations. Thus, Applicant respectfully requests that the rejection of Claims 8 and 9 be withdrawn and that they be allowed.

[6] *In re Royka*, 490 F.2d 981, 985, 180 USPQ 580, 583 (CCPA 1974).

Commissioner for Patents
October 17, 2006
Page 21 of 22

Serial No. 10/764,247 Confirm. No.: 8047
Art Unit: 2133 Examiner: Baker, Stephen M.
IBM Docket: FR920020090US1 (4206)

<u>New Claims</u>

One new independent claim, 13, and seven new dependent claims, 14-20, have been appended to the claims. All eight new claims are neither anticipated nor obvious in light of either Apple or Brueckheimer because the new independent claims of 13-20 incorporate distinct features from that of Apple and Brueckheimer. For instance, independent claim 13 describes "An apparatus to correct an error in a data packet ..." which has "a first circuit to generate a syndrome via forward error correction bits ... wherein the forward error correction bits are selected via a shortened group of vectors ...". As discussed in the previous remarks for Claims 7, 8, and 9, neither Apple nor Brueckheimer describe using such a shortened group of vectors to generate the forward error correction bits. Claims 14-20, being dependent Claims for Claim 13, also incorporate distinct features from what has been discussed in prior art references.

Applicant is confident that the new claims add no new matter and that all of the elements for the claims can readily be found in the specification. For example, one embodiment of an apparatus to correct one or more errors in a data packet can be found in figure 8, as described on pages 21 and 22 of the specification. The apparatus of figure 8 has a "logic block" (810) circuit which may generate syndromes for forward error correction bits via a shortened group of vectors. Figure 8 also has circuits (850 and 860) which may save information for the errors of data packets so that multiplication errors in subsequent packs may be corrected.

The features of apparatuses described by Claim 13, as well as Claims 14-20, offer significant advantages over Apple, Brueckheimer, and the other prior art references. Thus, Applicant respectfully suggests that the differences between Apple, Brueckheimer, and the amended and new claims are neither anticipated nor obvious in light of Apple and Brueckheimer so the claims should be allowed.

Commissioner for Patents
October 17, 2006
Page 22 of 22

Serial No. 10/764,247 Confirm. No.: 8047
Art Unit: 2133 Examiner: Baker, Stephen M.
IBM Docket: FR920020090US1(4206)

CONCLUSION

Applicant respectfully responds to the objections and traverses the cited references in regards to the claim rejections under 35 USC §§ 112, 102, and 103. Accordingly, Applicant believes that this response constitutes a complete response to each of the issues raised in the Office action. In light of the amendments made herein and the accompanying remarks, Applicant believes that the pending claims are in condition for allowance. Thus, Applicant requests that the rejections be withdrawn, pending claims be allowed, and application advance toward issuance. If Examiner has any questions, comments, or suggestions, the undersigned attorney would welcome and encourage a telephone conference at (512) 288-6635.
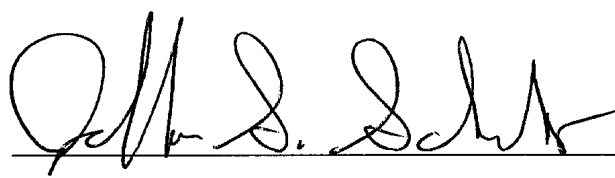
The Office is authorized to charge Deposit Account 50-0563 for fees related to the addition of 1 independent and 8 total new claims, totaling $200.00.

No other fees are believed due with this paper. However, if any fee is determined to be required, the Office is authorized to charge Deposit Account 50-0563 for any such required fee.

Respectfully submitted,

Oct 17, 2006
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Date

Jeffrey S. Schubert, Reg. No. 43,098
Customer No.: 45670
Schubert Osterrieder & Nickelson PLLC
6013 Cannon Mtn Dr, S14
Austin, Texas 78749
(512) 692-7297 (Telephone)
(512) 301-7301 (Facsimile)
Attorney for Applicant(s)